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The Full Scale Mechanics of Surficial Slope Stabilization

Slope stabilization systems that use flexible facings in combination with grouted anchors have been widely used to stabilize steep soil and weathered rock slopes for more than a decade. These systems have proven to be a very cost-effective solution, and have seen widespread acceptance. The tools used to design these systems have been based on small scale modeling and testing of individual components. Empirical evidence has shown that these design models are providing solutions that are technically sound.

The absence of scientific, full scale testing, however, has prevented full validation of the design tools. An extensive series of tests has now been performed to provide an in-depth look at the full scale mechanics of slope stabilization. The test series was based on the use of a simulated slope consisting of a large scale box that could be tilted to simulate a full range of slope angles up to 85°. Multiple soil types where tested in conjunction with a variety of different flexible facing materials. Instrumentation on the test box provided load information, and laser scanning of the slope surface provided detailed data regarding deformations of the soil.

This paper will discuss how this full scale test series has provided validation of the system dimensioning concept and the importance of load transfer within the system. It will also introduce new types of mesh and spike plates that offer solutions for a broader range of slope conditions as well as more detailed cost optimization of system designs.